

TOUCH SCREEN USER INTERFACE WITH EXPANDING TOUCH LOCATIONS FOR A REPROGRAPHIC MACHINE

This invention relates generally to the use of a touch screen user interface on a reprographic machine, and in particular, to a method of expanding the area for selection on the touch screen to improve accuracy of selection thereof.

INCORPORATION BY REFERENCE

U.S. Pat. No. 4,267,443 to Carroll et al. in specifically incorporated by reference herein by for the purpose of background information of the type of touch sensitive screen contemplated by the present invention.

BACKGROUND OF THE INVENTION

Touch sensitive screen user interfaces facilitate the selection of copying parameters on a reprographic system. Such systems allow users to visually determine the copying feature set that has been selected prior to starting the job, as well as, the status of the job during execution. Touch sensitive screen user interface systems, currently available on the market, employ a series of programming menus, whereby the copy features are selected by touching the desired feature icons contained on the display screen.

The most commonly used pointing device used for selection of features on a touch sensitive screen is a finger. Due to the size of the average finger, and errors in positioning the finger, it has been found necessary to construct menus of selectable features using relatively large touch sensitive zones for each selectable item on the menu. Typically these areas have minimum dimensions on the order of $\frac{1}{2}$ to $\frac{3}{4}$ inches ("finger resolution"). When combined with a rather limited display area, there is only a limited number of items that can be simultaneously displayed for possible selection on a specific display frame. It would be desirable to provide a greater number of items for selection, but reducing the sensitive zones to less than finger resolution results in difficulty in making selections due to the relative inaccuracy of positioning a large finger on a small area, including uncontrollable finger movement and inaccurate hand placement. Placement of the probe centered near the edge of the selection area may result in a toggling action as the finger is inadvertently and unconsciously moved between selections. Of course, the smaller the selection area, the nearer to an edge the probe must be placed. It would be desirable to avoid accidental selection of a feature due to relatively small, inadvertent or unconscious movement of the finger or probe.

U.S. Pat. No. 4,332,464 to Bartulis et al. discloses a user interface for a copying machine, comprising a video display and a touch sensitive device capable of detecting user requests via touching of the display surface. Moreover, the user interface is used to display visual elements representative of the feature set currently selected, including, optional feature selections that are available. U.S. Pat. No. 4,587,630 to Straton et al. discloses an intelligent programmable touch screen system which uses a cursor to provide feedback to a user. A means is provided for the system to correctly interpret a finger position and change it into a screen position. U.S. Pat. No. 4,587,520 to Astle discloses a cursor controlled page selection system using a cursor which can have a variety of physical characteristics.

This system makes use of a joystick, which is tracked by a cursor. U.S. Pat. No. 4,310,839 to Schwerdt discloses an interactive display system with touch data entry which uses touch switches and cursors to highlight a selection by inverting the entire selection. U.S. Pat. No. 4,686,332 to Greanias et al. discloses a finger touch detection system which calculates a screen position from a finger position. A touch cursor tracks the movement of the finger. U.S. Pat. No. 4,299,041 to Wilson shows a touch sensitive greeting card in which activation commences operation of an effects generator causing a change of appearance in a display. U.S. Pat. No. 4,755,811 to Slavin et al. shows an arrangement for touch controlled zoom of an image on a waveform display. Statutory Invention Registration H716 by MacDonald et al. shows a touch sensitive screen in which selection problems associated with parallax are remedied by placing a guard band around each touch sensitive area corresponding in size to an amount of parallax error. The patents and publications cited herein are incorporated by reference for their teachings.

SUMMARY OF THE INVENTION

In accordance with the invention, there is provided a touch sensitive user interface which provides an increase in the size of the touch sensitive zone upon selection thereof, which allows certain selection of only a single touch sensitive zone and therefore, a single feature selection.

In accordance with one aspect of the invention, in a device such as an electrophotographic imaging system, including a touch sensitive user interface of the type having a display screen for displaying an image; control logic responsive to the touch sensitive user interface for determining the contact position of a probe, such as a finger, thereon; a display menu of operating features, represented by a plurality of images on the display screen, so that a user may make touch selections on the images corresponding to operating features desired; a system controller for identifying a contact zone of a predetermined size with respect to the display screen, the system controller actuating the feature within the system represented by a displayed image in response to user touch within a corresponding contact zone, acknowledging selection of one of the image-represented features by displaying it in a highlighted fashion the system controller enlarging the contact zone of a selected feature upon selection thereof, to a size accommodating a probe tip, without overlapping on adjacent areas.

In accordance with another aspect of the invention, contact positions in the region adjacent to the one or more activated selections are also increased in area, so that a user, in moving the probe within the region of contact, is able to select a single image, represented by a highlighted image, without overlapping contact.

These and other aspects of the invention will become apparent from the following description used to illustrate a preferred embodiment of the invention in conjunction with the accompanying drawings in which:

FIG. 1 is an isometric view of an illustrative xerographic reproduction machine incorporating the present invention;

FIG. 2 is a block diagram depicting the major elements of the printing system shown in FIG. 1;

FIG. 3 is a plan view illustrating the principal mechanical components of the printing system shown in FIG. 1;